MEDREG

Co-funded by the European Union

MED24-38GA-3.2

Mediterranean Electricity Markets Observatory – MEMO+

National Electricity Systems and Regional Overview

- 2024 Update -

Electricity Working Group (ELE WG)

Empowering Mediterranean regulators for a common energy future

ABOUT MEDREG

MEDREG is the Association of Mediterranean Energy Regulators, uniting 28 regulators from 23 countries across the European Union (EU), the Balkans, and the MENA region. Established in 2007 and co-funded by the European Union, MEDREG serves as a platform for cooperation, knowledge sharing, and capacity building in energy regulation. It promotes coherent regulatory approaches and practices at the regional level, aiming for progressive market integration within the Euro-Mediterranean basin. To support its members, MEDREG organises training sessions, workshops, and tailored hands-on initiatives that enhance the capabilities of energy regulators.

MEDREG's ultimate goal is to establish an integrated Euro-Mediterranean energy market that strengthens energy security and drives a clean energy transition. This includes integrating renewable energy sources, reinforcing cross-border infrastructure, promoting innovation, enhancing energy efficiency, and advancing renewable gases such as hydrogen. Furthermore, MEDREG advocates for transparent and non-discriminatory regulations to attract infrastructure investments, modernise electricity and gas markets, and improve consumer protection.

The MEDREG Secretariat is located in Milan, Italy.

For more information, visit www.medreg-regulators.org.

ACKNOWLEDGMENTS

This report is the result of a project undertaken by MEDREG's Electricity Working Group (ELE WG), which provided the data and conducted the analysis. MEDREG extends its gratitude to the ELE WG for their valuable contributions and dedicated efforts.

For any inquiries regarding this paper, please contact:
MEDREG Secretariat
Email: info@medreg-regulators.org

DISCLAIMER

This publication was produced with financial support from the European Union. Its contents are the sole responsibility of MEDREG and do not necessarily reflect the views of the European Union.

TABLE OF CONTENTS

1 Introduction and Methodology 5

1.1 Report Objective 6

1.2 Methodology 6

2 Status of the Mediterranean Electricity Market 8

2.1 Macro Analysis of the Mediterranean Region 8

2.2 Electricity Demand and Generation 9

2.3 Electricity Infrastructure and Cross-Border Interconnections 12

3 Status by Subregion of the Mediterranean Electricity Market 16

3.1 Macro Analysis of the Subregions 16

3.2 Electricity Demand and Generation by Subregion 17

3.3 Electricity Infrastructure Development by Subregion 20

4 Conclusion 24

LIST OF FIGURES

Figure 1. Replies to the ELE WG Benchmarking and Data Source 7

Figure 2. Population Growth of the Mediterranean Region 8

Figure 3. GDP per Capita in the Mediterranean Region 9

Figure 4. Electricity Demand and Generation in the Mediterranean Region 10

Figure 5. Energy Mix of the Mediterranean Region 11

Figure 6. Installed Capacity in the Mediterranean Region 11

Figure 7. Transmission and Distribution Length in the Mediterranean Region 12

Figure 8. Transmission and Distribution Losses in the Mediterranean Region 13

Figure 9. Electricity Consumers in the Mediterranean Region 13

Figure 10. Electricity Cross-Border Interconnections in the Mediterranean Region 14

Figure 11. Population Growth by Subregion 16

Figure 12. GDP per Capita by Subregion 17

Figure 13. Electricity Demand and Generation by Subregion 18

Figure 14. Energy Mix by Subregion 19
Figure 15. Installed Capacity by Subregion 20
Figure 16. Transmission and Distribution Length by Subregion 21
Figure 17. Electricity Losses by Subregion 22
Figure 18. Electricity Consumers in EU MEDREG Members 23
Figure 19. Electricity Consumers in the Balkans and Türkiye 23
Figure 20. Electricity Consumers in Middle Eastern MEDREG Members 23
Figure 21. Electricity Consumers in the Maghreb Region 23

Executive Summary

Since 2007, the Mediterranean Electricity Market Observatory (MEMO) has been monitoring the evolution of national, sub-regional, and regional electricity markets. Conducted every two years, MEMO assessments are primarily based on data and clarifications provided by MEDREG members. The 2024 edition includes, for the first time, data from the Regulatory Commission of the Republic of North Macedonia (ERC), following its recent accession to MEDREG. Additionally, this edition features expanded insights, including new data on electricity consumers, pricing trends, and cross-border interconnections, providing a more comprehensive picture of the regional electricity market.

The Mediterranean region continues to experience steady economic and demographic growth, driving an increasing demand for electricity. In response, regional countries have developed strategic plans to transition towards low-emission and clean energy sources. This transition has significantly influenced market design and investment strategies across various market segments.

The energy mix in the region has become increasingly diversified, not only to advance the energy transition but also to strengthen energy security. Investments in renewable energy sources have accelerated, and the integration of these resources into national grids has become a priority. This diversification contributes to reducing dependency on fossil fuels while ensuring a stable and sustainable energy supply.

Infrastructure development remains a key focus, with a significant number of cross-border interconnection projects completed, under construction, or planned. These developments highlight the growing cooperation among sub-regions in the Mediterranean zone. On a national level, countries are also enhancing their internal infrastructure to accommodate rising demand and facilitate the integration of renewable energy sources into the grid.

This report serves as a vital tool for tracking changes in the electricity market, enabling MEDREG and its members to strengthen capacity-building efforts and enhance their expertise. By identifying market priorities and fostering collaboration among regulatory counterparts, the report supports the continued development of a more integrated, resilient, and efficient Mediterranean electricity market.

Additionally, this edition features further details and new data, such as information on electricity consumers, electricity prices, and enhanced insights into cross-border interconnections.

1. Introduction and Methodology

1.1. Report Objective

This report provides an updated analysis of recent developments in electricity markets and structures within the Mediterranean region, incorporating data from 2021 to 2023. This benchmarking exercise identifies the most significant challenges faced by National Regulatory Authorities (NRAs) and serves as a platform for knowledge sharing among MEDREG members.

The 2024 edition follows the same methodology as previous versions but introduces several new features and areas of focus. It now incorporates data from North Macedonia, a new MEDREG member, enhancing the comprehensiveness of the regional analysis. Furthermore, this edition includes detailed assessments of electricity consumers, categorised by type, along with the average annual electricity prices across the region.

Additionally, the report expands on the topic of cross-border interconnections, recognising the significant changes and growing importance of regional integration within Mediterranean electricity markets. This includes a deeper examination of the role of interconnections in facilitating market integration and ensuring energy security, as well as the challenges and opportunities they present.

Overall, the report aims to stimulate discussion among MEDREG members on the following aspects:

- The internal structure of the electricity market
- The regional electricity market and cross-border interconnections
- Information systems, data monitoring, and exchanges
- Challenges in the energy transition, including renewable energy source (RES) integration and consumer engagement

Additionally, the report analyses data and information exchange between NRAs and electricity market actors. This section was included in the benchmarking at the request of MEDREG members to support the development of new information systems based on the experiences of other members or to improve existing systems.

In parallel, MEDREG will continue to develop complementary reports and studies to promote cooperation and information sharing among its members, advancing towards a fair, functional, and integrated Euro-Mediterranean energy market.

1.2. Methodology

This report is based on responses from MEDREG members to a benchmarking survey prepared by the ELE WG chairs in collaboration with the MEDREG Secretariat.

This survey consists of six sections:

1. General information

2. Main data on the electricity system
3. Governance and unbundling regime
4. Internal structure of the electricity market
5. Regional electricity market system – purpose, status, and role of cross-border interconnections
6. Electricity consumers and electricity prices

Data and information were collected from members by the MEDREG Secretariat, which jointly developed this report with the ELE WG chairs. To analyse the evolution of the electricity market and identify regional challenges and priorities, a sub-regional approach was applied.

For analysis purposes, MEDREG members were grouped into four zones without implying any political or economic bias:

- Maghreb member countries – Algeria, Libya, Morocco, and Tunisia.
- Middle East member countries – Egypt, Israel, Jordan, Lebanon, and Palestine.
- Balkans and Türkiye – Albania, Bosnia-Herzegovina, Croatia, Montenegro, North Macedonia, Slovenia, and Türkiye.
- EU member countries – Cyprus, France, Greece, Italy, Malta, Portugal, and Spain.

Out of 23 member countries, including the newly added North Macedonia, the Secretariat received 17 responses, as shown in the next figure.

To complete the statistical overview of the Mediterranean electricity market, missing data and information were supplemented using NRAs' annual reports or external sources.

Figure 1. *Replies to the ELE WG Benchmarking and Data Source*

4. Status of the Mediterranean Electricity Market

2.1. Macro Analysis of the Mediterranean Region

As the Mediterranean region's population continues to grow, energy market integration is becoming increasingly essential to meet rising demand, harness renewable resources, and ensure energy security. A unified and efficient energy market can support sustainable development while alleviating the environmental and economic pressures associated with population growth.

The figure below illustrates steady population growth in the Mediterranean region, increasing from **534 million in 2020** to **547 million in 2023**. This trend underscores the pressing need for a more integrated and efficient energy market.

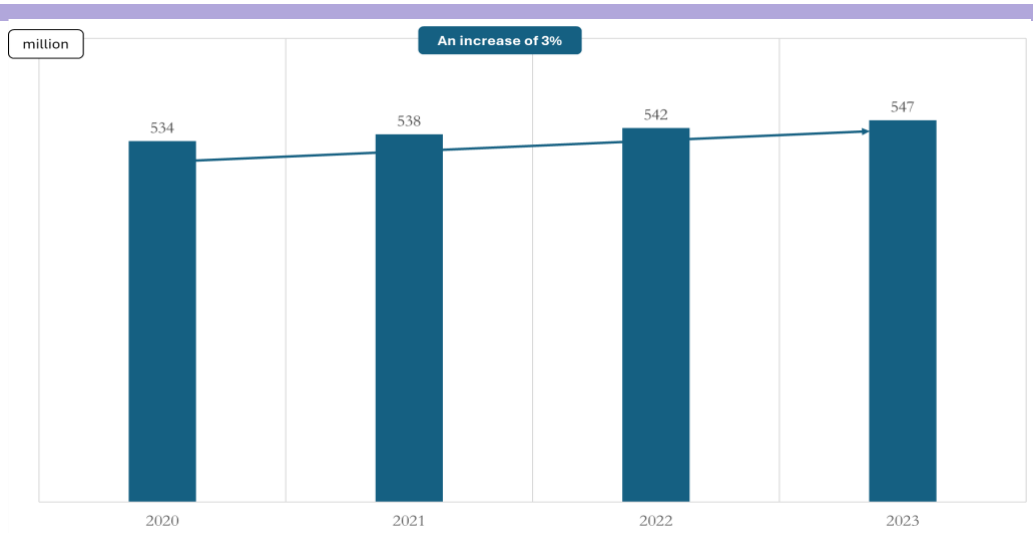

Figure 2. *Population Growth of the Mediterranean Region*

In addition to population growth, GDP per capita increased by 11% during the same period, as shown in Figure 3. It rose from USD 14,902 in 2020 to USD 16,282 in 2022, highlighting the region's economic growth and improving living standards.

This economic expansion, combined with demographic growth, has significantly impacted energy demand, reinforcing the need for enhanced energy market integration.

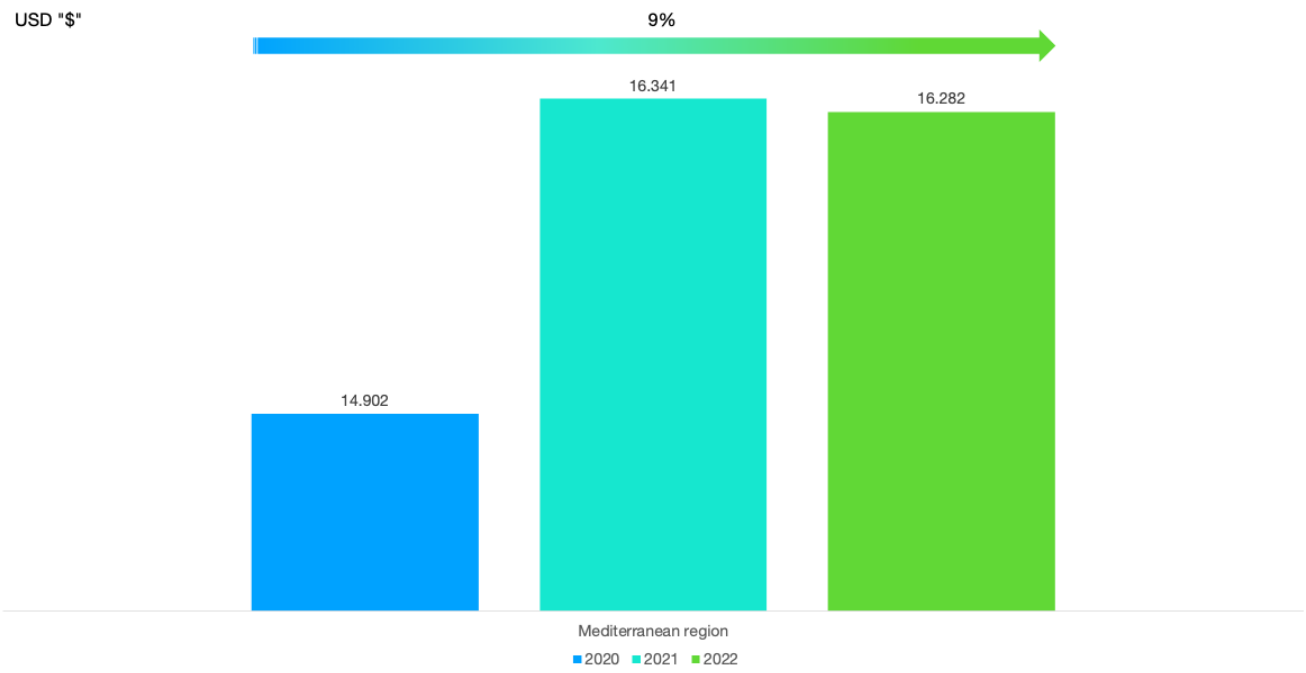

Figure 3. *GDP per Capita in the Mediterranean Region*

2.2. Electricity Demand and Generation

Between 2020 and 2023, the Mediterranean energy market faced various challenges that affected it both directly and indirectly.

In 2020, the Covid-19 pandemic led to a noticeable decline in energy consumption, as extensively analysed in MEDREG's 2019/2020 report.

As markets began to recover, another crisis emerged: the Ukraine–Russia conflict. This war significantly impacted the Mediterranean energy market by driving energy prices to record highs and disrupting gas supplies, particularly in Europe. These disruptions led to reduced demand and placed considerable strain on market recovery efforts, prompting temporary measures to shield consumers from the crisis.

The figure below illustrates how energy demand and generation evolved during this turbulent period.

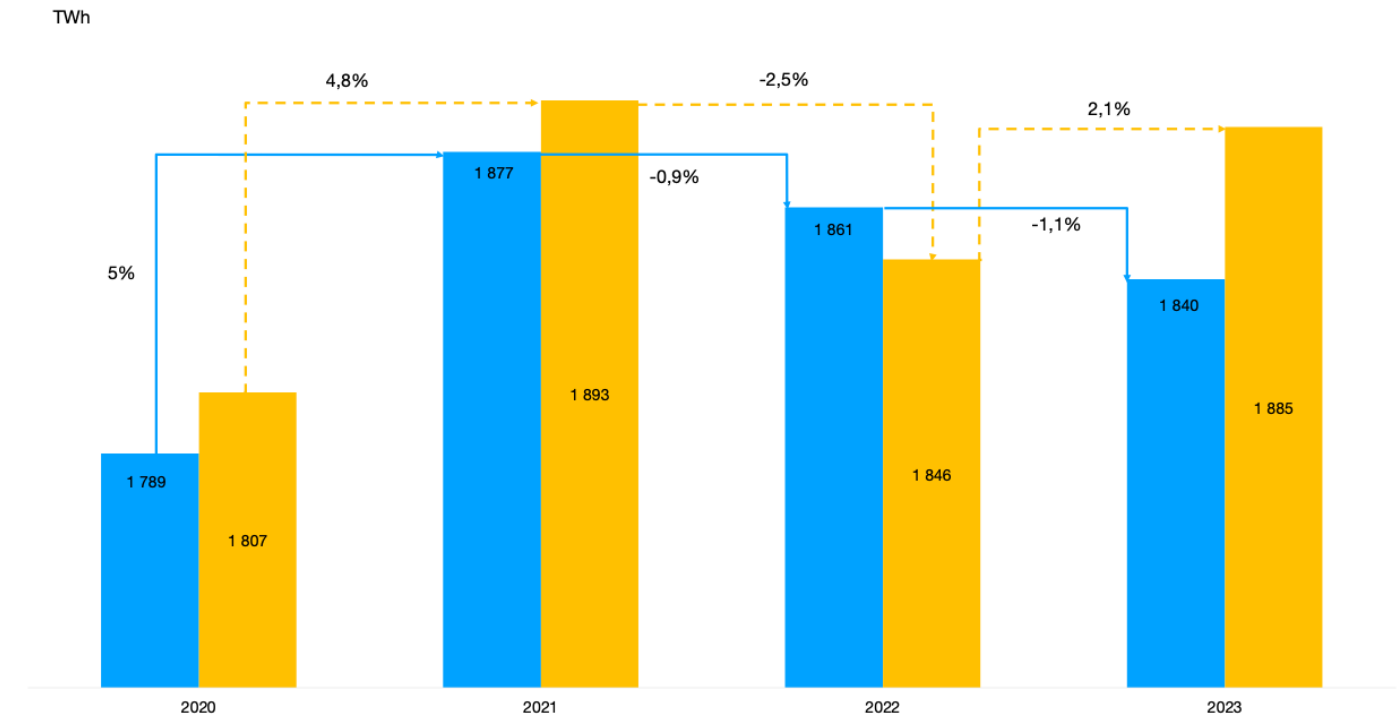

Figure 4. *Electricity Demand and Generation in the Mediterranean Region*

The energy mix in the Mediterranean region is highly diversified. Nuclear power is the primary energy source, followed by natural gas and renewable sources, such as wind, hydro, and solar PV. However, this composition varies significantly across subregions, reflecting differences in resource availability and energy policies.

The figure below provides an overview of the Mediterranean region's energy mix and installed capacity by technology. Further details on the subregional energy mix will be explored in the next chapter.

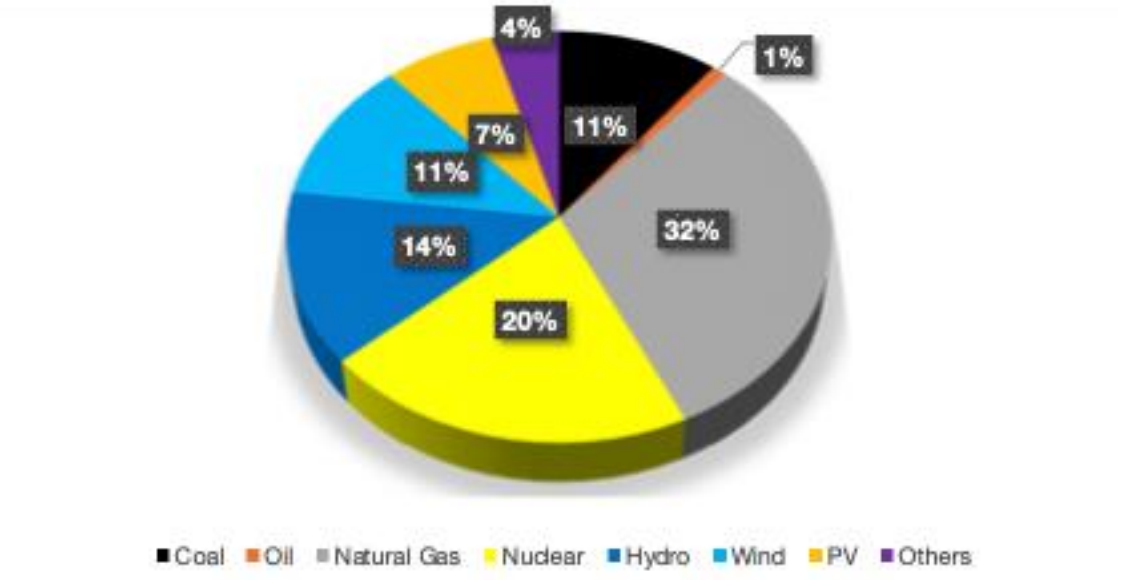

Figure 5. *Energy Mix of the Mediterranean Region*

Natural gas remains the dominant source of installed capacity in the Mediterranean region, followed by renewables, as shown in the figure below. This trend highlights the region's progress in promoting the energy transition and increasing the adoption of cleaner energy sources.

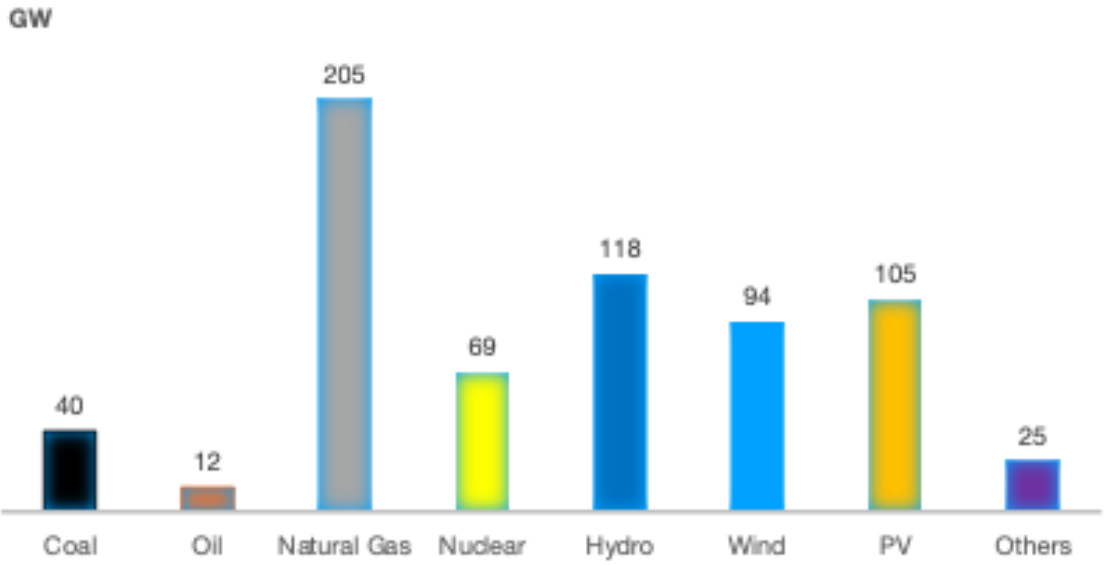

Figure 6. *Installed Capacity in the Mediterranean Region*

2.3. Electricity Infrastructure and Cross-Border Interconnections

The electricity infrastructure in the Mediterranean region, particularly the transmission and distribution networks, has expanded significantly, reaching a total length of 6.7 million kilometres in 2023. More than 90% of this infrastructure consists of medium- and low-voltage networks, as illustrated in the figure below.

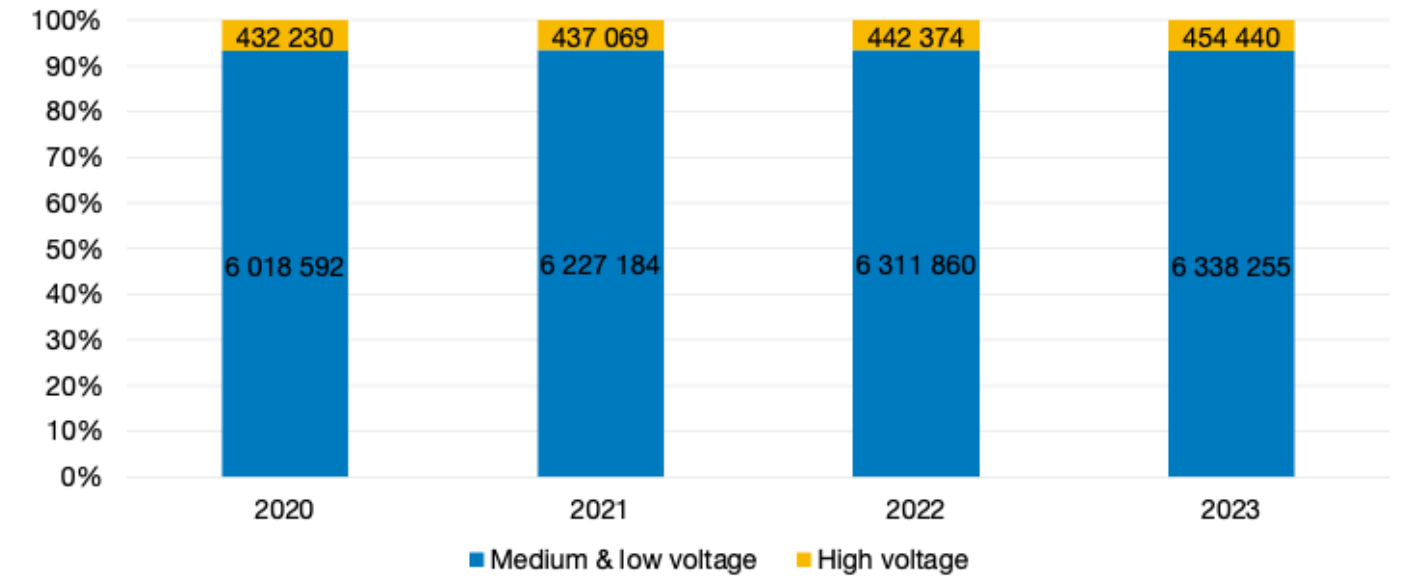

Figure 7. *Transmission and Distribution Length in the Mediterranean Region*

The report also evaluates electricity transmission and the distribution performance. The figure below presents the regional average of losses, encompassing both technical and non-technical losses. Detailed analyses by subregion and country will be provided in the following chapters.

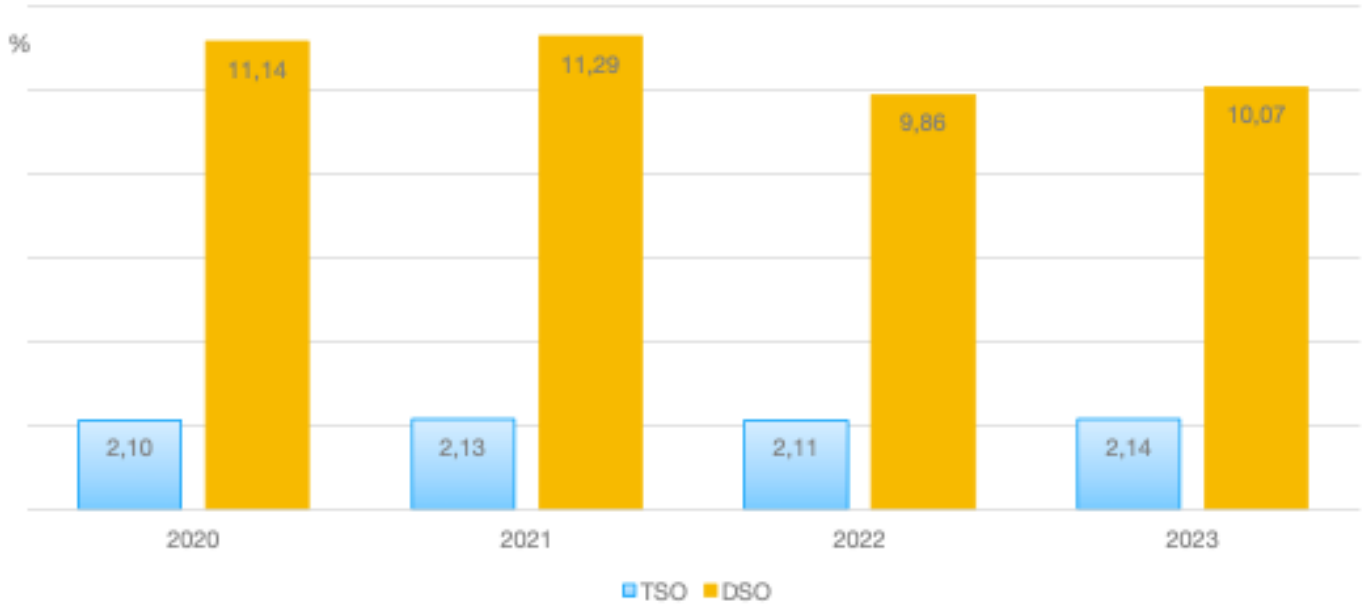

Figure 8. *Transmission and Distribution Losses in the Mediterranean Region*

The Mediterranean region has approximately 237 million electricity consumers, the majority of whom are low-voltage users, followed by medium-voltage consumers and high-voltage consumers. The next chapter and the annex provide a detailed analysis of the growth and distribution of electricity consumers by type and country. Notably, the increase in electricity consumers is most pronounced in the Balkans and the southern shore of the Mediterranean region.

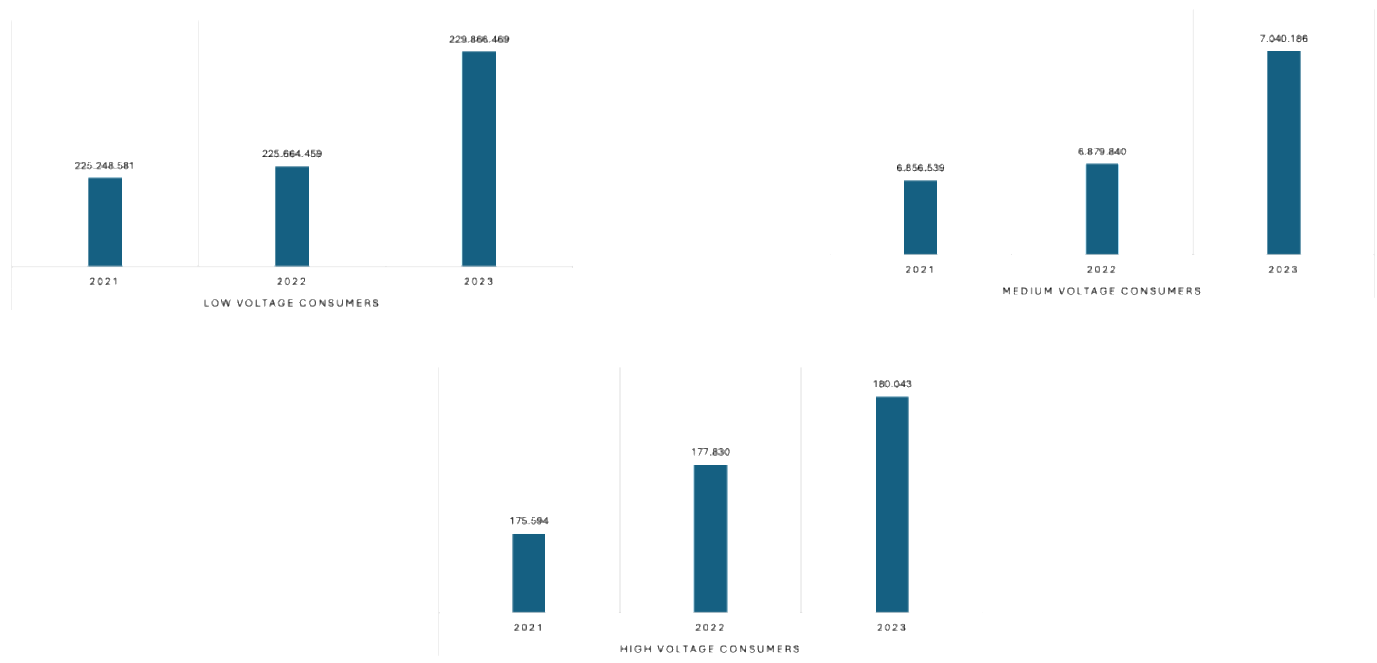

Figure 9. *Electricity Consumers in the Mediterranean Region*

To conclude the overview of the Mediterranean electricity market, MEDREG has developed a representative map of cross-border interconnections. This map is for illustrative purposes only and does not depict the precise locations of these interconnections.

The northern shore of the Mediterranean region features a well-integrated and highly developed network of cross-border interconnections. In contrast, the southern shore has significantly fewer and less developed interconnections, resulting in underdeveloped regional electricity markets.

However, in recent years, the European Commission has approved several interconnection projects, classified as either Projects of Common Interest (PCI) or Projects of Mutual Interest (PMI). Notable examples include the Italy–Tunisia interconnection and feasibility studies for projects such as Algeria–Italy and Egypt–Cyprus.

If these cross-border interconnections are realised, the Mediterranean region could develop into a unified and integrated electricity market. However, achieving this goal will require significant efforts to harmonise regulatory frameworks and technical standards, ensuring seamless energy exchanges between European and non-European markets.

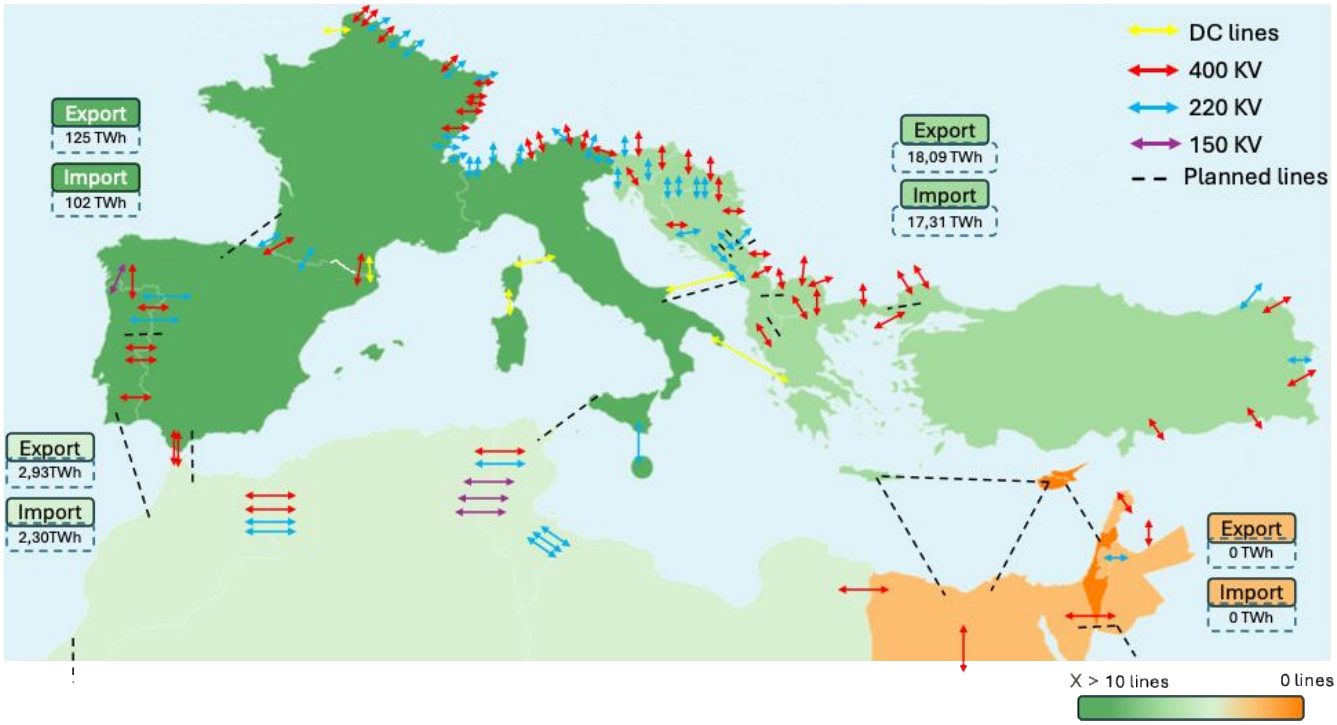

Figure 10. *Electricity Cross-Border Interconnections in the Mediterranean Region*

In summary, the Mediterranean is a highly dynamic and strategically important region. Its central location makes it particularly susceptible to the direct and indirect impacts of global events, as evidenced over the past two years.

The European Commission's targets and objectives significantly influence energy developments in the region. Most European countries have set ambitious energy transition goals, including achieving net-zero emissions by 2050. To meet these targets, stronger interconnections with the Balkans and southern shore countries will be essential, particularly for the development and utilisation of renewable energy sources.

While European countries have made significant progress in adopting renewable energy, they now face challenges such as curtailment of renewable energy production and the need to stabilise their energy systems. A potential solution lies in harnessing the renewable energy potential of southern shore countries, where development remains in its early stages.

Realising this vision requires strengthened cooperation and collaboration between European and non-European countries. The expansion of renewable energy in the region depends on knowledge sharing, capacity building, and the establishment of financing mechanisms. These efforts will facilitate the development of a sustainable and integrated Mediterranean energy market, benefiting all stakeholders.

3 Status by Subregion of the Mediterranean Electricity Market

3.1.Macro Analysis of the Subregions

The Mediterranean region's energy demand, generation mix, installed capacity, infrastructure development, and electricity consumption are generally well-developed. However, much of this progress is primarily driven by European countries.

This chapter examines the four subregions defined in the introduction: the Balkans and Türkiye, Maghreb member countries, Middle East member countries, and European member countries.

The figure below illustrates population growth in recent years across these subregions. The highest growth rates are observed in the Maghreb and Middle East member countries.

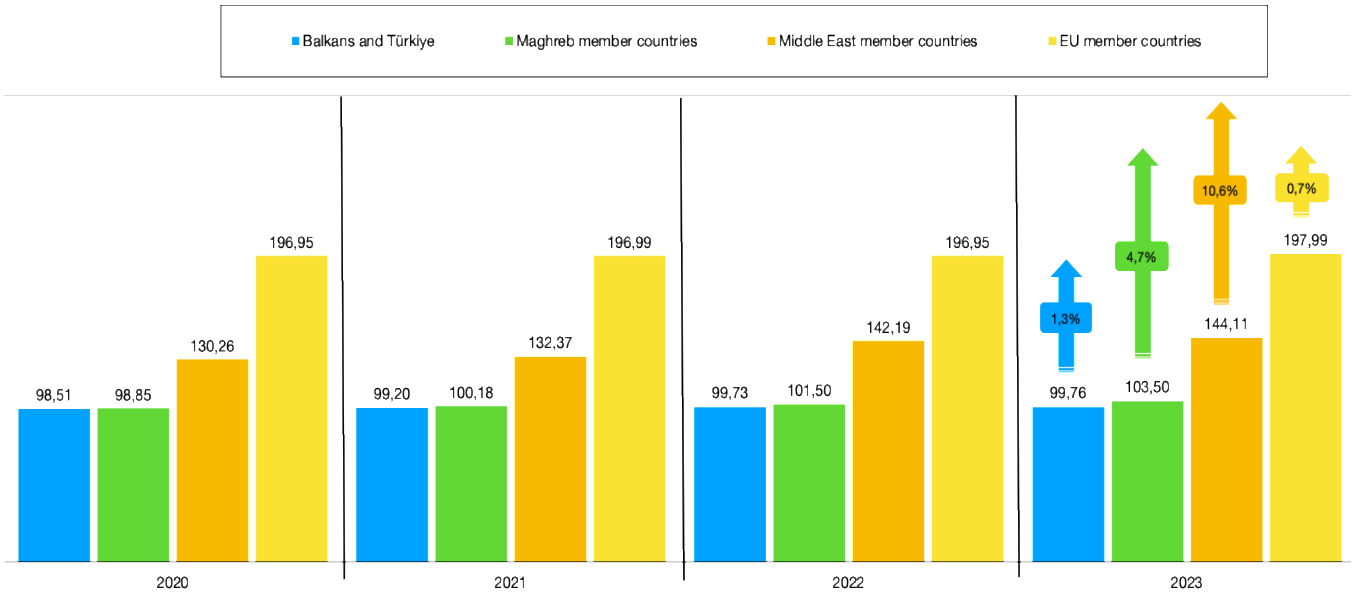

Figure 11. *Population Growth by Subregion*

The second figure presents an overview of GDP per capita, showing that the subregions with the highest population growth—namely the Maghreb and Middle East—also recorded the most significant increases in GDP per capita. Notably, the Maghreb region experienced a 30% rise in GDP per capita.

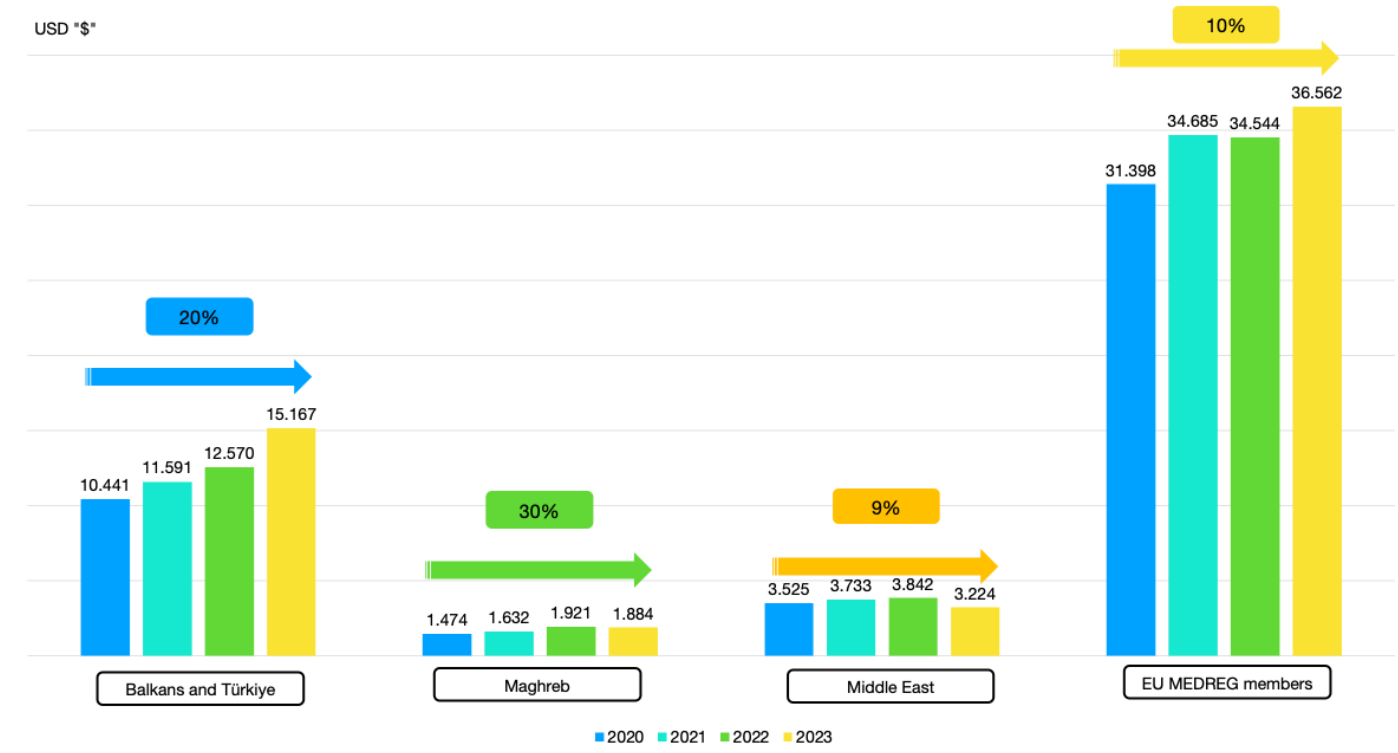

Figure 12. *GDP per Capita by Subregion*

3.2. Electricity Demand and Generation by Subregion

Both population growth and GDP growth directly influence electricity demand and generation across all countries, as illustrated in the figure below. The left side of the figure represents electricity demand, while the right side depicts electricity generation. The gap between generation and demand reflects cross-border exchanges, as well as technical and non-technical losses.

The trends in demand and generation indicate that the southern shore of the Mediterranean is experiencing substantial growth, whereas the northern shore has shown either steady development or only marginal increases in electricity demand.

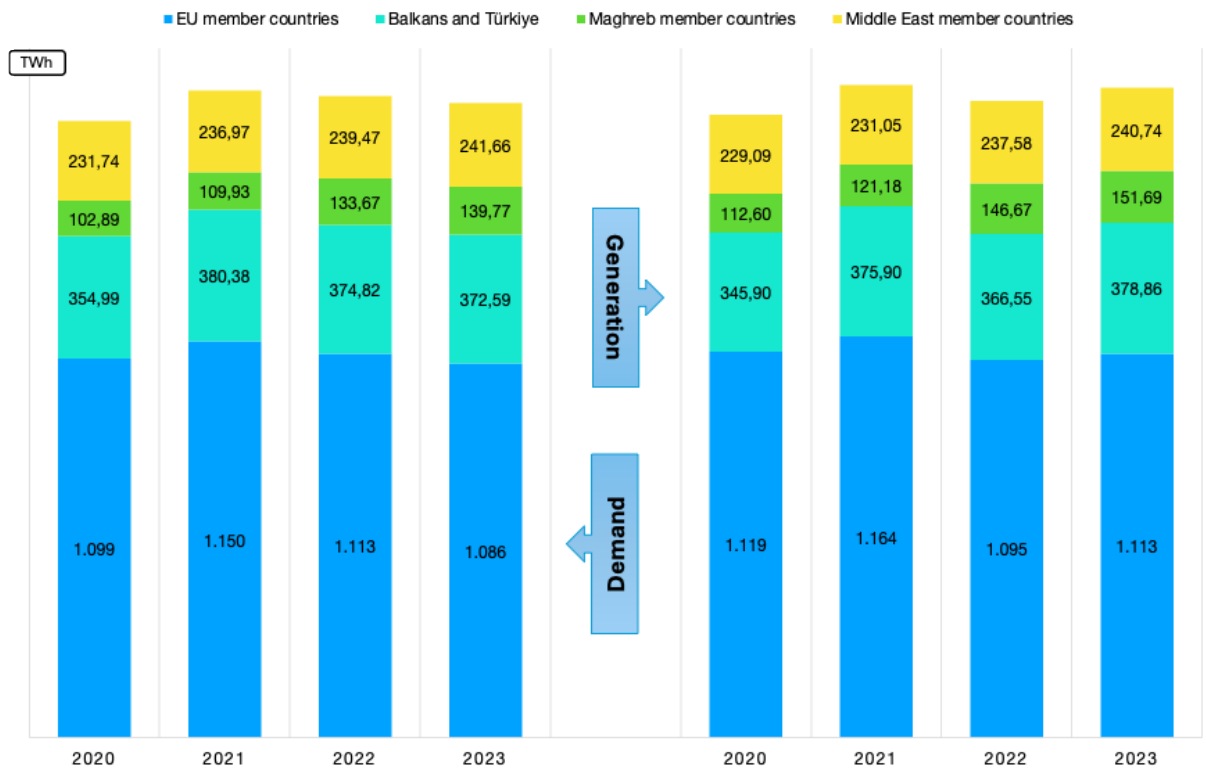

Figure 13. *Electricity Demand and Generation by Subregion*

Each subregion in the Mediterranean has a distinct energy mix, ranging from highly diversified to more concentrated compositions reliant on one or two primary energy sources. In European member countries, the energy mix closely reflects that of the broader Mediterranean region, featuring a well-balanced combination of nuclear power, natural gas, and renewable energy sources such as hydro and wind.

In the Balkans, the energy mix remains diversified, though fossil fuels—particularly coal and natural gas—continue to play a significant role. In contrast, the energy mix on the southern shore of the Mediterranean, especially in the Maghreb region, is predominantly reliant on natural gas and coal. Meanwhile, in the Middle East, some countries, such as Lebanon, depend heavily on natural gas and oil.

However, the southern shore of the Mediterranean has substantial potential for renewable energy development. Implementing supportive regulatory frameworks and incentives could attract greater investment in renewable projects, enabling the export of clean energy to the northern shore and advancing the region's energy transition.

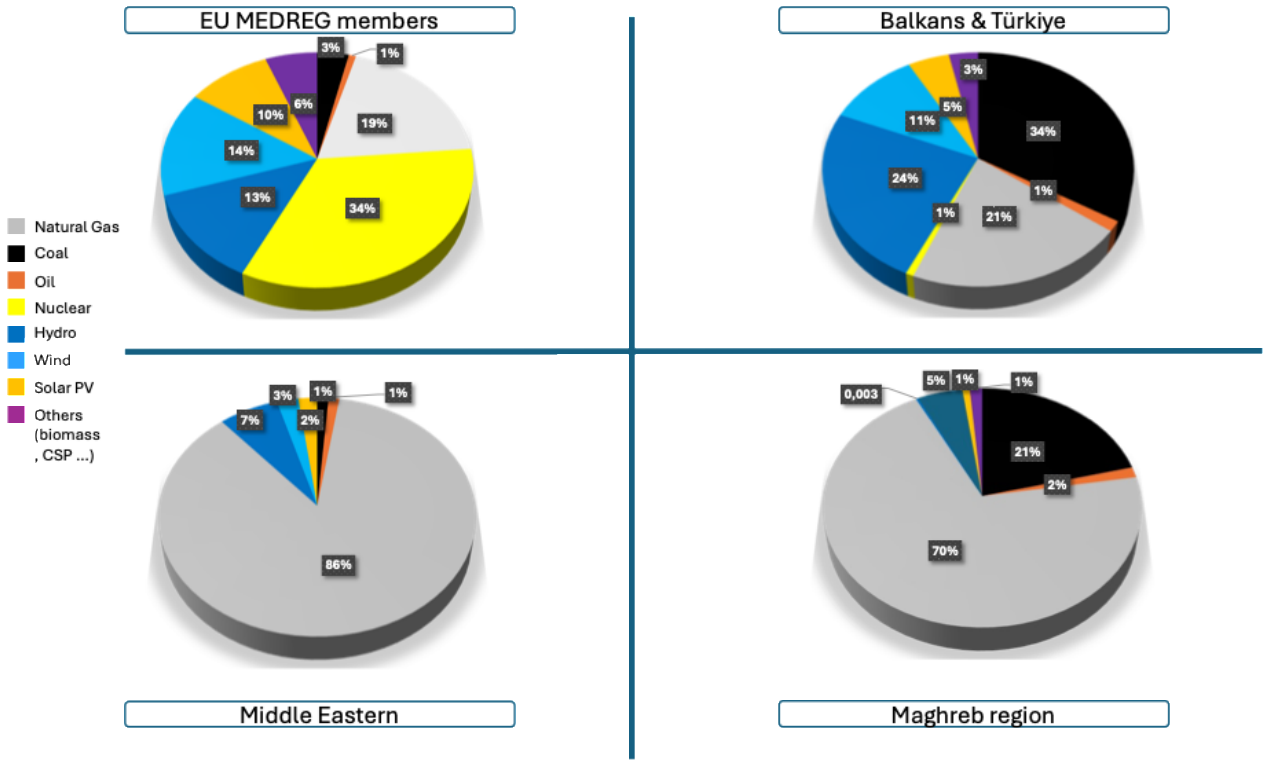

Figure 14. *Energy Mix by Subregion*

When examining installed capacity across subregions, EU member countries maintain a highly diversified energy mix, incorporating natural gas, nuclear, and renewable sources such as hydro, wind, and solar PV.

In contrast, other regions rely more heavily on one or two dominant energy sources. The Balkans primarily depend on hydropower, while the Maghreb region is dominated by natural gas and coal. In the Middle East, natural gas and oil remain the most commonly used energy sources.

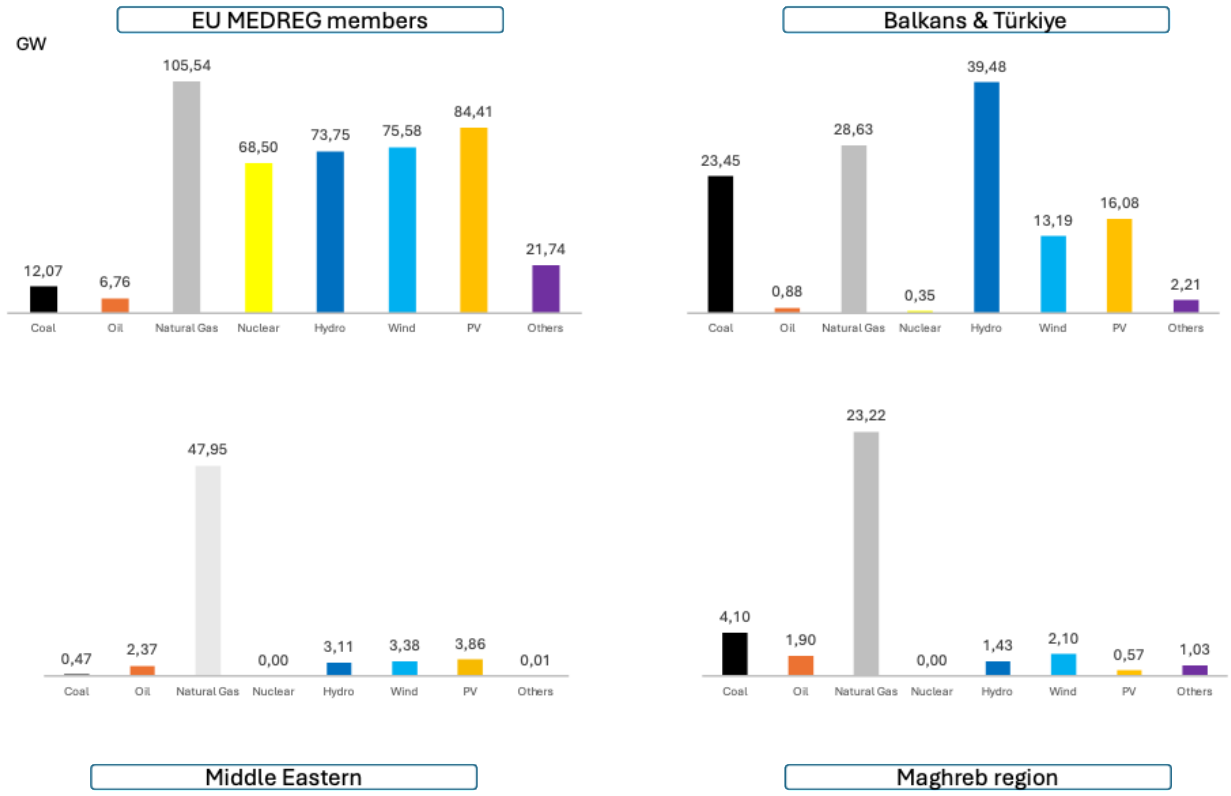

Figure 15. *Installed Capacity by Subregion*

3.3. Electricity Infrastructure Development by Subregion

Electricity infrastructure development, particularly in transmission and distribution networks, follows a similar pattern across all subregions. Over 90% of these networks consist of medium- and low-voltage lines, while high-voltage lines account for the remaining 10%.

Infrastructure expansion has been significant across all subregions, with the most notable developments occurring on the southern shore of the Mediterranean. This growth is primarily driven by the need to extend networks and meet the rising electricity demand of a growing population.

Figure 16. *Transmission and Distribution Length by* Subregion

Losses vary significantly across subregions. In European member countries, both transmission and distribution losses remain relatively low due to ongoing infrastructure development and network upgrades that have minimised inefficiencies.

However, in other subregions, there is still considerable room for improvement, particularly at the distribution level. In the Balkans and Türkiye, the average loss is around 10%, while in the Maghreb region, it is approximately 8%. Notably, both regions have made substantial progress in reducing losses over the past three years, as illustrated in the figure below.

Figure 17. *Electricity Losses by Subregion*

Electricity consumer distribution across subregions follows a similar pattern, with consumers classified into low-, medium-, and high-voltage categories. In regions with well-developed industries, the share of medium- and high-voltage consumers is notably higher.

However, in southern shore countries, the number of low-voltage consumers is growing at a significantly faster rate than that of medium- and high-voltage consumers. This trend reflects the increasing connection of new residential customers to the grid.

The following figures illustrate the distribution of electricity consumers across each subregion:

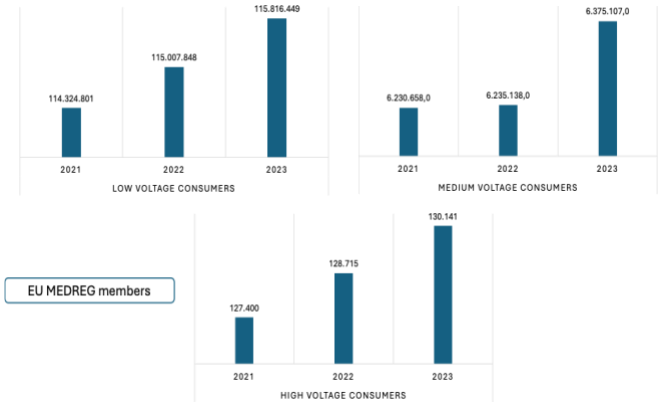

Figure 18. *Electricity Consumers in EU MEDREG Members*

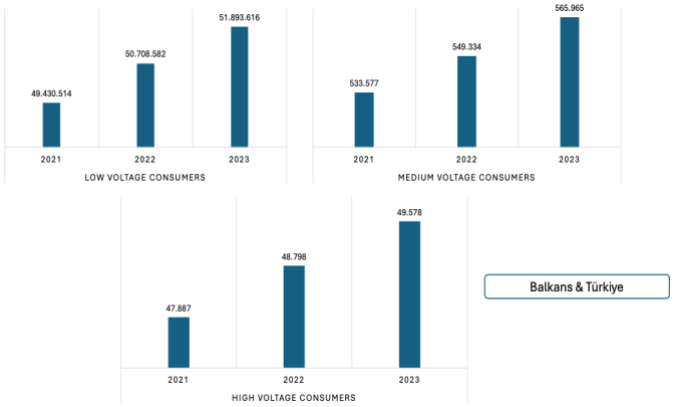

Figure 19. *Electricity Consumers in the Balkans and Türkiye*

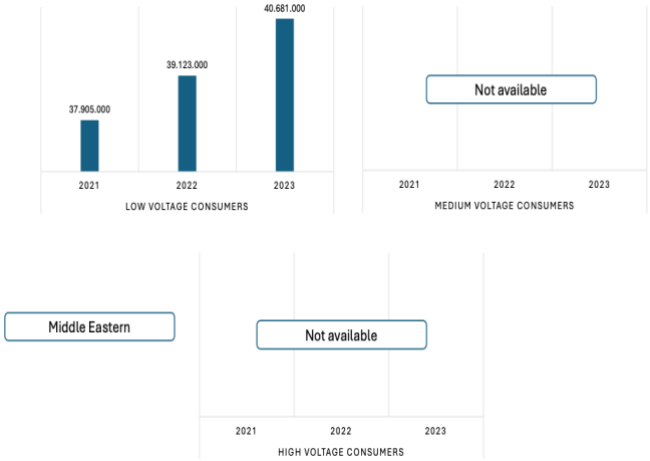

Figure 20. *Electricity Consumers in Middle Eastern MEDREG Members*

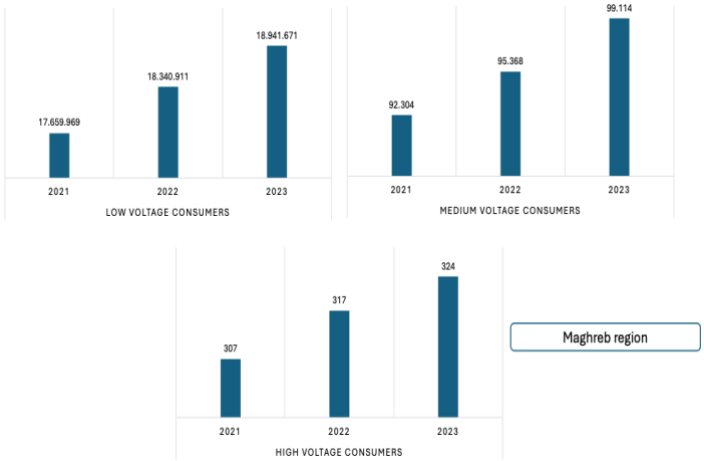

Figure 21. *Electricity Consumers in the Maghreb Region*

4 Conclusion

This report has provided a comprehensive overview of electricity market statistics across Mediterranean subregions. It is important to emphasise that the region's overall energy landscape is largely shaped by its European member countries, which lead in both consumption and production. However, as highlighted in Chapter 3, each subregion has distinct characteristics influenced by geography and energy resources. For instance, hydropower remains a key energy source in the Balkans, whereas natural gas plays a dominant role in countries such as Egypt and Algeria.

Understanding these unique regional profiles enables a more targeted approach to energy development, fostering opportunities within each subregion and across the Mediterranean as a whole. Ultimately, the long-term objective is to establish a more integrated Mediterranean energy market—one that accelerates the energy transition, reduces dependence on fossil fuels, and promotes the expansion of renewable energy production.

To turn this vision into reality, harmonising regulatory frameworks is essential. Aligning these regulations will enable smoother energy exchanges between subregions and strengthen regional cooperation. Additionally, fostering knowledge sharing, best practices, and collaborative problem-solving will be crucial in developing robust electricity markets. Equally important is ensuring that Mediterranean energy policies align with the European Commission's strategy and market design, which significantly influence electricity market structures across the region.

Achieving an integrated Mediterranean electricity market will require a unified and sustained effort. Platforms such as the Mediterranean Energy Regulators (MEDREG) play a crucial role in fostering collaboration—particularly by supporting southern shore countries in harmonising regulations, expanding energy trade, and implementing joint projects that benefit the entire region.

The final section of this report presents country profiles developed by MEDREG in partnership with its members. These profiles offer a concise overview of each country's electricity market, detailing the roles of energy regulators, key market statistics, and institutional frameworks. Updated every two years, they ensure an up-to-date understanding of evolving regulatory landscapes and market dynamics.

Empowering Mediterranean regulators
for a common energy future

Follow us on

www.medreg-regulators.org

Via Lazzaretto, 3. 20124 Milano - Italy
info@medreg-regulators.org

MEDREG

Co-funded by
the European Union